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ABSTRACT

To assess the need for technology programs in the Kokomo, Indiana area, such background data (population projections for the region, the educational level of adults living in the region, and the number and size of firms located in the area) concerning Kokomo and the counties surrounding it were compiled. The researchers formulated projected requirements for engineering technicians, computer programmers, computer-integrated manufacturing technicians, and quality control specialists in the area. Next, these projections were corroborated through interviews with representatives of local industries and appropriate agencies and by comparing the local projections with national employment projections for the same occupations. As a result of an analysis of these data the following actions were recommended: development of a computer-integrated manufacturing technology program, provision of training for quality control specialists, development of flexible course offering schedules and special admission and counseling procedures to accommodate the special needs of adult learners, formation of an advisory committee, and increased efforts in the areas of coordination and liaison. (MN)

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TECHNOLOGY PROGRAMS IN REGION 5
THE KOKOMO, INDIANA AREA

AN UPDATE MANPOWER REPORT

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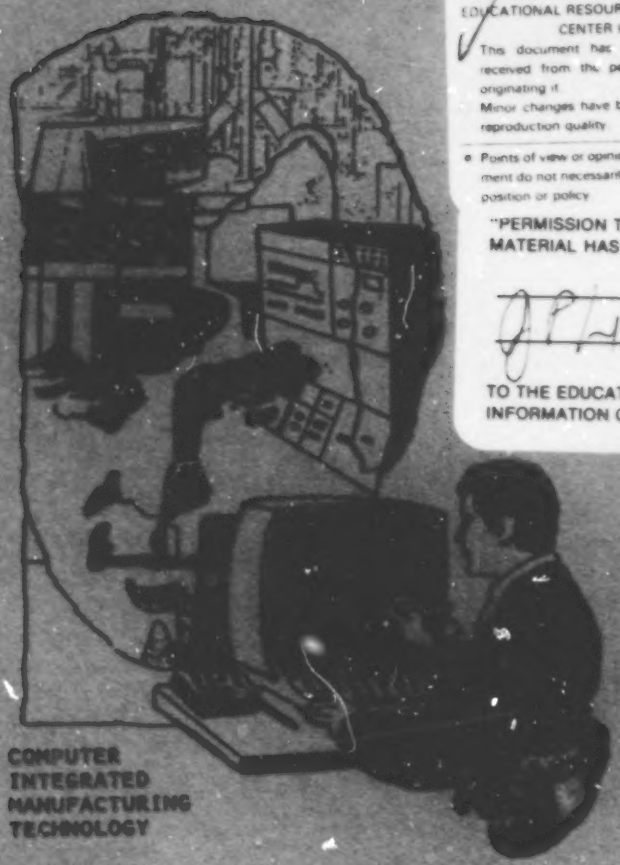

COMPUTER INTEGRATED MANUFACTURING TECHNOLOGY

MANPOWER REPORT 84-7

25 SEPTEMBER, 1984

Dr. J. P. Lisack, Professor of Technology and Director
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THE KOKOMO, INDIANA AREA
AN UPDATE MANPOWER REPORT

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AN UPDATE REPORT CONCERNING THE

NEEDS FOR TECHNOLOGY-TYPE PROGRAMS IN REGION 5 THE KOKOMO AREA IN INDIANA

I. INTRODUCTION

There is growing evidence that unless research results and high technology are applied, productivity increased, quality of product improved, and costs reduced, existing U.S. firms will be less able to meet competition and survive, much less grow. In addition to the necessity for survival (and for hopefully growth) of existing Indiana firms, a broader diversification of industrial and business firms must be brought into Indiana communities.

Basic to the application of high technology and increased productivity is a qualified and competent work force in all industries. New employees must be prepared with the knowledge and skills required to move effectively into work-settings of growing complexity. In addition, appropriate continuing education is essential for adults now employed or seeking employment.

Evidence in this report supports the need to expand the current Engineering Technology and Computer Technology programs being offered in cooperation with Indiana University Kokomo (IUK) Campus by adding the Purdue associate in applied science (two-year) program in Computer Integrated Manufacturing Technology (CIMT). Data presented in this report include authentication of the following: (1) a need exists to prepare new entrants into the local work force with the knowledge and qualifications which can be attained through studies in manufacturing technology, (2) Purdue technology programs and laboratories now in place at IUK are of the nature and scope which facilitate and complement implementation of the CIMT program (in

fact, many of the courses now being offered and facilities available are applicable) and (3) Kokomo is an ideal location for this program due to the size and types of industry in this region and the support of industrialists.

In essence, this study, and the conclusions and recommendations made herein, are an important response to the greater Kokomo area technical manpower needs. Implementing the recommendations made would constitute a positive step in helping more of the individuals who live there, the firms they work in, as well as improving the economy of their community and the State.

This manpower report is the result of a viable partnership and cooperation among educators from Purdue and Indiana Universities and representatives from industries and key organizations in the Greater Kokomo Area (Economic Region 5). Previous manpower reports related to this region include:

Manpower Report 66-7, "Selected Technical Education Needs in Howard County, Indiana, 'The Kokomo Study,' " 1 August 1966.

Manpower Report 68-1, "Computer and Electronic Data Processing Manpower Requirements, Kokomo," 1 March 1968.

Manpower Report 73-2, "A Report of the Population and Characteristics of High School Seniors in Indiana's Economic Region No. V (The Kokomo Region)", 5 April 1973.

Manpower Report 74-3, "Manpower Requirements for a Mechanical Engineering Technology (MET) Program in Kokomo, Indiana Area," 15 November 1974.

Manpower Report 80-2, "Postsecondary Education in Indiana: Enrollments and Educational Attainments," 24 September 1980.

Manpower Report 83-2, "A Manpower Study Justifying the Needs for a Bachelor of Science Degree Program in Electrical Technology at the Indiana University-Kokomo Campus." September 1, 1983.

2. BACKGROUND: POPULATION AND EDUCATIONAL ATTAINMENTS

A. Demographics: Region 5 and Internal Counties (Plus Grant County)

Region 5 is made up of 6 counties (Cass, Fulton, Howard, Miami, Tipton and Wabash). Data are also presented for Grant County

which is adjacent to Howard County. This region is projected to grow by nearly 10,000 people between 1980 and the year 2000 (from 240,400 to 250,200) a growth rate of 4.1%. The largest county in this region is Howard (Kokomo being the principal city). Howard County's current population is about 87,000 and it is projected to increase to about 90,300 by the year 2000, a growth rate of nearly 4%. This increase is largely due to "natural causes," i.e., there will be more births than deaths. (The number of births now averages nearly 1,400 per year, however, births are expected to drop to about 1,200 per year by the year 2000.) Population growth in Howard County would be higher if the current net out-migration could be reversed (which may be possible if the economy in Kokomo continues to revive strongly).

Grant County had a population of 80,900 in 1980; however, its population is projected to decrease to 74,800 by the year 2000, a 7.5% decrease. Tipton has the smallest population (16,800) which is expected to decrease slightly in size through 1990.

Significantly, Region 5 has a projected decrease in actual numbers in all of the younger age-cohort groups. The large projected increase in population is expected in the 35 to 54 year age groups; this is largely due to the Post World War II baby boom. This "bulge" in the distribution of population has significant manpower, economic, and educational implications that should be considered in related policy making and planning for the future. The 35 to 50 year age groups will constitute the bulk of the Region's work force for the next twenty years.

Another age group of importance is the continuing trend for a larger percentage of the population to be in the older age cohorts

(i.e., 65 to 74 and 75 and over).

Table 1 illustrates the highlights of population changes by numbers and percentages. Detailed population data for the State of Indiana and the counties being reviewed are presented in another report, "Selected Population Data for Region 5 plus Grant County--1980 to the Year 2000." August 11, 1983. Purdue's Office of Manpower Studies.

TABLE 1

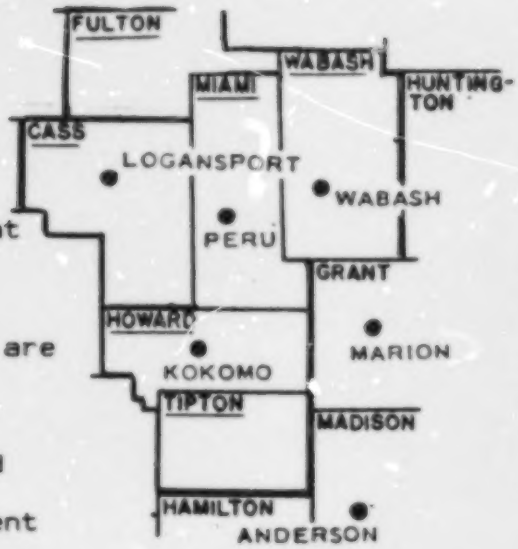
POPULATION PROJECTIONS FOR REGION V PLUS GRANT COUNTY[1/]

	1980	1985		1990	
	Number	Number	5 Year Percent Change	Number	5 Year Percent Change
INDIANA	5,490,200	5,568,000	1.4%	5,673,900	1.9%
REGION V	240,400	242,100	0.7%	245,100	1.2%
Howard	86,900	87,300	0.5%	88,300	1.1%
Cass	40,900	41,000	0.2%	41,300	0.7%
Miami	39,900	40,200	0.8%	40,800	1.5%
Wabash	36,600	36,700	0.3%	37,100	1.1%
Fulton	19,300	20,200	4.7%	21,000	4.0%
Tipton	16,800	16,700	-0.6%	16,600	-0.6%
Grant	80,900	78,500	-3.0%	77,000	-1.9%

	1995		2000	
	Number	5 Year Percent Change	Number	5 Year Percent Change
INDIANA	5,772,200	1.7%	5,855,500	1.4%
Region V	247,800	1.1%	250,200	1.0%
Howard	89,400	1.2%	90,300	1.0%
Cass	41,600	0.7%	41,900	0.7%
Miami	41,400	1.5%	42,000	1.5%
Wabash	37,300	0.5%	37,500	0.5%
Fulton	21,500	2.4%	21,900	1.9%
Tipton	16,600	NC*	16,600	NC
Grant	75,800	-1.6%	74,800	-1.3%

*No change

1/ *Source: Indiana University Division of Research, School of Business and the Indiana State Board of Health. "Indiana County Population Projections, 1985-2020." Dated 1983.*



B. Educational Attainment Comparisons

There is evidence which indicates that productivity and per capita income are associated with educational level. There are much data which show that the higher the educational level, the higher the wage and salary earned and the lower the unemployment rate. These findings are particularly relevant to Indiana and to the counties in Region 5, because the postsecondary educational attainments of Hoosiers living there are well below the National averages as well as the Indiana averages. The relatively lower college-level educational attainments in Indiana--and in Region 5--are evident in Table 2.

TABLE 2

EDUCATIONAL ATTAINMENT OF ADULTS* IN THE UNITED STATES, INDIANA, REGION 5, AND ITS INTERNAL COUNTIES, PLUS GRANT COUNTY[2/]

	No. of Adults ≥25 Yrs	Educational Level				
		Elem	High School		College	
		0-8 Yrs	1-3 Yrs	4 Yrs	1-3 Yrs	≥4 Yrs
UNITED STATES	132,775,652	18.4%	15.3%	34.4%	15.7%	16.3%
INDIANA	3,135,772	16.6%	17.1%	41.7%	12.1%	12.4%
REGION 5	138,355	14.9%	16.4%	47.6%	11.3%	9.8%
Howard	49,659	15.2	16.3	45.6	11.9	11.0
Cass	24,387	12.5	17.7	50.0	10.9	8.9
Miami	21,905	14.8	14.9	50.1	12.3	7.9
Wabash	20,707	15.6	17.5	44.8	10.3	11.8
Fulton	11,715	15.2	16.3	49.5	10.5	8.5
Tipton	9,982	17.7	14.7	49.8	9.6	8.2
Grant	46,199	17.1%	20.2%	42.2%	10.7%	9.7%

*25 years of age and older

2/ Source: U. S. Bureau of the Census. 1980 data.

C. Statements of Governor Robert D. Orr

"TECHNOLOGY and Education: a Key to Future Prosperity." This was the title in the feature article in Educator's Edition,[3/] a publication of the Indiana Department of Public Instruction. The article was written by Governor Robert D. Orr. He stated that economic recovery calls for enormous effort "to work our way back to a more prosperous condition," and he stressed that application of technology was the key to our progress. He asks, "Will the Hoosier population be trained for these new jobs? Will the jobs be there for those Hoosiers who are trained?" He emphasized the need to tackle these issues.

On another occasion, the Governor made a speech to the Indiana State Board of Education[4/] and said that Hoosiers must look to higher education to help solve the State's social and economic problems. He said "Education must go hand in hand with economic development if the State is to become a social and economic leader for the 1990's and beyond." He called for better training to improve knowledge and skills needed to pursue careers in high technology fields.

3. THE WORKFORCE IN REGION 5

There were more than 78,000 employees in Region 5 that worked in more than 4,300 firms as reported by the Indiana Employment Security Division (4th Quarter 1982 data). The largest industrial division was Manufacturing with nearly 33,000 people who worked in 320 firms. The largest group (more than 13,000 employees) within the manufacturing division was

3/ *Volume VI, No. 4, 1983. First page.*
4/ *Reported in The Indianapolis Star, 10 December 1982, p. 22.*

employed in 23 firms that manufactured Electrical & Electronic Equipment and Machinery. The next largest division was Services (nearly 17,000 employees in 1,100 firms, followed by 13,000 who worked in 1,300 Retail Trade establishments.

See Table 3 on the next page for Region 5 employment as reported by the Indiana Employment Security Division.

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TABLE 3

EMPLOYMENT AND NUMBER OF FIRMS IN REGION 5
BY INDUSTRIAL DIVISIONS AND LARGER SUBDIVISIONS*
(4TH QUARTER, 1982)

▷ Type of Business/Service	S.I.C. Code(s)	Region 5 Employees Number	Employees Percent	Firms Number	Firms Percent
▷Agriculture	01-09	1411	1.8%	92	2.1%
Agricultural Production - Crops	(01)	(779)		(23)	
▷Mining	10-14	87	.1%	10	.2%
▷Construction	15-17	1586	2.0%	440	10.2%
Special Trade Contractors	(17)	(872)		(250)	
▷Manufacturing	20-39	32793	42.0%	320	7.4%
Food Products	(20)	(1805)		(29)	
Fabric Products	(23)	(852)		(7)	
Printing & Publishing	(27)	(1108)		(38)	
Rubber & Plastic Products	(30)	(1152)		(11)	
Stone, Clay, Glass & Concrete Products	(32)	(856)		(24)	
Primary Metal Industries	(33)	(4423)		(18)	
Fabricated Metal Products	(34)	(2274)		(53)	
Machinery	(35)	(1430)		(61)	
Electrical & Electronic Machinery	(36)	(13031)		(23)	
Transportation Equipment	(37)	(3252)		(8)	
▷Transporation, Communication, & Utilities	40-49	3213	4.1%	182	4.2%
Motor Freight Transportation	(42)	(1116)		(104)	
Communication	(48)	(732)		(24)	
Utilities	(49)	(651)		(22)	
▷Wholesale Trade	50,51	2607	3.3%	329	7.6%
Durable Goods	(50)	(1217)		(170)	
Nondurable Goods	(51)	(1390)		(159)	
▷Retail Trade	52-59	13087	16.8%	1344	31.1%
Building Materials	(52)	(694)		(101)	
General Merchandizing	(53)	(1769)		(50)	
Food Stores	(54)	(1939)		(132)	
Auto Dealers & Gas Service Stations	(55)	(1605)		(242)	
Apparel	(56)	(630)		(108)	
Restaurants & Bars	(58)	(4484)		(357)	
▷Finance, Insurance, Real Estate	60-67	2640	3.4%	312	7.2%
Banking	(60)	(1278)		(23)	
▷Services	70-89	16624	21.3%	1112	25.8%
Personal Services	(72)	(642)		(156)	
Business Services	(73)	(585)		(86)	
Health Services	(80)	(6541)		(282)	
Educational Services	(82)	(5616)		(10)	
Social Services	(83)	(877)		(44)	
Membership Organizations	(86)	(721)		(99)	
▷Public Administration	91-93	3987	5.1%	177	4.1%
Local	(93)	(2354)		(64)	
State	(92)	(474)		(84)	
Federal	(91)	(1159)		(29)	
▶Total Business/Services		78035	100.0%	4318	100.0%

IESD Data: Includes only employment covered by Indiana Employment Security.

4. HIGH TECHNOLOGY

A. Impact on Manpower

More and more concern is being expressed about the qualifications of people in the work force. An impressive recent article in the Changing Times titled "Get the Jump on Tomorrow's Jobs"[5/] reiterated that high technology applies to upgrading most current industries as well as to emerging ones. Some specific quotes include:

"Welcome to the post-industrial revolution. Whether you work in a plant or an office, a store or a lab, in government, business or heavy industry, the way you do your job is changing. Basic industries, manufacturing processes and forms of work with which workers have long been comfortable are in the midst of a bumpy transition to an era shaped largely by the impact of technology on all aspects of life....

"For thousands of workers, the last few years have been devastating. Many who have been laid off from their jobs in the auto, steel, rubber and other basic industries will never return to their factories....

"All of tomorrow's good jobs won't be in new occupations. The revamped and modernized smokestack industries will still employ a sizable segment of the work force...but

"The notion that workers who have lost jobs in the core industries can simply move over to the high-tech industries is overly simplistic....

5/ August issue of Changing Times, 1983, pp. 27-31.

"There are shortages of specialists in such positions as electrical and electronics technicians numerically controlled machine maintenance and repair technicians; and instrumentation technicians with microprocessor backgrounds....

"Education at all levels will be necessary to smooth out the coming shifts in the work force."

Excerpts from BUSINESS AWAKES TO THE CRISIS IN EDUCATION, Businessweek*, July 4, 1983*

"The quality of the work force is a critical concern for executives analyzing how to reestablish American competitiveness in world markets. Already, according to Frank T. Carey, chairman of International Business Machines Corp., some major suppliers may soon be unable to meet their commitments to IBM because they lack the needed qualified personnel. Many companies are being forced to offer increasing amounts of training so new workers are able to use more sophisticated machines and processes. Such lack of trained personnel worries have been around for some time, but suddenly firms such as IBM, machine tool makers and countless other businesses are seeing them as national problems of crisis proportions.

To meet its work force needs business will "have to work with us to mold school systems that can deliver for them," says Governor James B. Hunt, Jr., North Carolina, the co-chairman of the National Task Force on Education for Economic Growth."

* * * *

The above excerpts are further indicators of the statement made in "Samuelson Economics" textbook, Eleventh Edition, page 77, where he writes "Technological improvements, better capital goods, and a

more highly trained work force have raised production faster than the growth of population." His data show this trend has continued from 1890 to the present time.

B. Multiplier Effect of Adding New Jobs in Manufacturing

The addition of a new manufacturing plant or expansion of an existing one is highly significant to a community. The summary below illustrates the favorable impact of new jobs.

Multiplier Effect of
Adding 100 New Mfg. Jobs
Over Five Years

- Stimulates 45& additional new jobs in service and supply sectors
- Adds 8.9 new business establishments
- Bank deposits rise $3.1 million
- $882,000 in increased local property taxes
- $27,500,000 in additional personal income

SOURCE: Univ. of Kansas Study, 1983

Of course, the opposite effect is felt when a firm moves out or reduces its employment. It is clear that a community must do all possible to keep current firms productive and encourage expansion, and to attract new ones. A common denominator to these goals is a trained manpower force: this means both an adequate supply of new young technical program graduates and continuous retraining and upgrade training of adults in the work force.

5. MANUFACTURING PRODUCTIVITY GROWTH IN THE UNITED STATES AND OTHER INDUSTRIAL NATIONS[6/]

The facts need no embellishment; manufacturing productivity growth in the United States has been on a relative decline for years, thus lessening our ability to compete in both domestic and world

6/ *SOURCE: The Society of Manufacturing Engineers, One SME Drive/ P. O. Box 930, Dearborn, Michigan 48121. 1 December 1983.*

markets. (Japan, Sweden, Italy and France have had higher rates of productivity growth than the U.S. since 1960.) Yet, manufacturing has always been the linchpin of the American economy; it accounts for about 25% of GNP, and is the Nation's principal wealth-producing activity. Thus, steps must be taken to restore America's manufacturing productivity growth if we are to avoid endangering the National economy and, ultimately, the welfare of the Nation itself.

A major contributor to this problem is the inadequate supply of academically qualified manufacturing engineers and technologists. In 1983, of the 1,314 accredited engineering programs in the United States, only three were in manufacturing engineering; of the 726 accredited engineering technology programs, only 18 were in manufacturing engineering technology.

NOTE: Much valuable data and materials related to the training of manufacturing engineers and technologists have been provided by the Society of Manufacturing Engineers. They are pertinent to the planning of training programs in this field.

6. METHODOLOGY OF COMPUTING TECHNICAL MANPOWER AND PROGRAM NEEDS

In view of the foregoing sections, the next step is to determine what the specific technical manpower and related educational needs are for Region 5. The methodology applied is described next.

A. Manpower Needs

The techniques applied involve the following steps: First, a determination is made by Standard Industrial Classification Code (SIC) of all the various manufacturing and service firms which previous studies have indicated employ persons trained in technical programs. The second step is to make a listing of all the firms by SIC Code and size of employment in Region 5 that were identified in Step 1.

Third, a determination is made of the proportion of employees in these firms that are employed in occupations with skills and qualifications applicable to technology-type training programs. These occupational distribution factors come from a National manpower study made by the U.S. Department of Labor which identified every occupation normally found in each type (classification) of industry. The study results are reported in the OES.[7/] The OES report presents the percentage of people in each occupation normally found within each type of industry. For example, a certain percent of a given type of manufacturing firm's employees are made up of specific types of engineers, technicians, clerks, draftsmen, tool and die makers, machinists, etc. By applying these employee percentage factors for each pertinent occupation that are related to technology programs, one can compute the numbers and types of technicians normally employed in each industry. After the proportional number of each type of occupation under study that is employed is determined, the next step is to apply the normal attrition and turnover from that occupation, as well as the anticipated growth in order to calculate the annual recurring requirements for new personnel. Adjustments are made according to recommendations of labor analysts in the State Research and Statistics office, Indiana Employment Security Division, local industry representatives, and previous studies.

7/ *Occupational Employment Statistics. Staffing Patterns in the Manufacturing Industries in Indiana: 1977 and as revised. Research and Statistics Section, Indiana Employment Security Division and U.S. Department of Labor, February 1980.*

Finally, the requirement for upgrading and retraining adults now in the work force must be determined. These are critical data for a number of reasons. One is there is a growing proportion of adults between the ages of 35 to 49, and secondly, educational programs are justified not only on the basis of adequate job opportunities for new graduates, but in addition, needs for continuing education of adults, both now and in the future. *See Tables 4 and 5 for calculations of selected technician needs in Region 5.*

B. Educational Program Requirements

Educational program requirements are based on both quantitative and qualitative considerations. If the calculations described above result in determining that sufficient numbers of a certain type new technician are required on an annual recurring basis and the upgrade and retraining of working adults in that type of work is significant, then the specific related educational program (curriculum) is identified. As a rule, an applicable existing program is found to be pertinent to prepare individuals with the desired skills and knowledge. Occasionally, it is necessary to recommend modifications to existing programs or even to recommend a new one. Normally, a local industrial advisory committee is formed to assist in the planning for and implementation of each technical program.

C. Review and Corroboration

It is of benefit to involve representatives from local industries and members of appropriate agencies in the review of data, conclusions and recommendations. Letters of support and concurrence are valuable additions to manpower studies. (Such support is

amply provided for in Region 5 as described later in this report.)

7. ANNUAL RECURRING REQUIREMENTS FOR TECHNICIANS IN REGION 5

Based on the employment data presented in Table 3, and applying the methodology described earlier, the technician-type manpower training requirements for Region 5 counties are as described below.

A. Engineering Technician Training Requirements

The data confirm impressive needs exist in Region 5 to train new engineering technicians and to provide related training to upgrade and retrain adults now in the workforce. The needs for the Purdue programs in Electrical and Mechanical Engineering technologies programs now underway in Kokomo are reinforced by the updated information in this report. See Table 4 for related details.

B. Computer Programmer Training Requirements

Emerging training needs of significance include the preparation of new computer programming specialists, the upgrading or retraining of adults now in the workforce who are working as programmers, as well as the need to familiarize others with computer applications in their work and in their studies. Based on the employment data presented in Table 3, and applying the methodology described earlier in this report, the soundness of the decision to offer the Computer Technology program in Kokomo is confirmed by these more recent data. (See Table 4 for specific needs for programmers in Region 5.)

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C. Computer Integrated Manufacturing Technology

One of the technology programs of significance needed in Region 5 is Computer Integrated Manufacturing Technology (CIMT).* A relevant program built on local needs should be designed to meet technician requirements related to modern manufacturing processes: the program should include considerations of a founcation in mechanical and electrical engineering technology courses, plus courses such as modern technical graphics, computer applications in industry (e.g., CAD/CAM), manufacturing processes and supervision. An adequate base of math, physical sciences, and communication skills is also very important.

The CIMT program should be designed to prepare technicians who can perform effectively in industrial functions betweeen product design and product marketing, and who have the foundation to continue to learn and improve.

It is necessary for the technician to understand and apply proper procedures in manufacturing processes and methods of production; also included is the ability and willingness to help plan the practices of manufacturing, apply the latest techniques, and to help develop the tools, processes, machines and equipment; and finally, the technician should help to integrate the facilities, manpower, and systems for producing quality products and services with optimal expenditure.[8/]

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*NOTE: The CIMT program is being implemented on Purdue's West Lafayette Campus in the fall of 1984. The curriculum is being

8/ Paraphrased from the definition of manufacturing engineering technology as presented by the Board of Directors of the Society of Manufacturing Engineers.

refined by a faculty committee composed of representatives from the departments of electrical and mechanical engineering technologies, computer technology, technical graphics, supervision and industrial technology. An industrial advisory committee will assist in program development and related actions.

It is essential that this type of program be planned, implemented, evaluated and modified as needed with the assistance of a local industrial advisory committee representing manufacturing firms in Region 5.

The needs for the CIMT program can be gleaned from an examination of the needs for technicians shown in Tables 4 and 5. Pertinent occupations include Mechanical Engineering Technicians, Draftsmen & Tool Programmers, Industrial Engineering Technicians, and "Other" Engineering Technicians. Because this is a relatively new program and technician category, the exact proportion of "pertinent" technician occupation positions that articulate with the CIMT program has not yet been determined. However, discussions with members of manufacturing industries and placement offices result in an estimate that CIMT training would apply to approximately one-third of the MET and EET engineering technicians and approximately 10% of the Draftsmen and Tool Programmers (Numerical Control) and 20% of "Other" Engineering Technicians. Using these parameters, it is calculated that there is a need for a program to accommodate up to 35 students to prepare new labor force entrant CIMT technicians and for the retraining and updating of current employees.** (See Table 5 for details.)

***NOTE: Total annual recurring requirements include job openings due to expansion and replacement (i.e., due to retirements and deaths), turnover, and upgrade or retraining of adults now in the workforce.*

IN SUMMARY, A CIMT ASSOCIATE DEGREE PROGRAM DESIGNED TO ACCOMMODATE 35 STUDENTS, COULD MEET CURRENT NEEDS FOR PREPARING NEW HIREE CIMT TECHNICIANS AND HELP TO UPGRADE/RETRAIN ADULTS NOW IN THE WORKFORCE. THESE NEEDS ARE GROWING OVER TIME.

TABLE 4

ANNUAL RECURRING REQUIREMENTS FOR TRAINED TECHNICIANS
IN REGION 5 WITHIN MANUFACTURING, SERVICE AND ALL OTHER INDUSTRIES

Occupation	Technical Employment[1] 4th Q. 1982	Technical Employment[1] Proj. 1985	Annual Recurring Needs for New Labor Force Entrants: Expansion[2]	Repl.[3]	Turnover[4]	Base Total	Exp. to Univ.[5]	Retraining & Updating: Base Total[6]	Exp. to Univ.[5]	Expanded Grand Total
Electrical/Electronic Engr. Technicians.....	340	396	18	11	19	48	51	40	42	93
Mechanical Engineering Technicians.....	178	175	16	7	8	31	33	16	17	49
Industrial Engineering Technicians.....	31	45	4	2	2	8	8	4	4	12
"Other" Engineering Technicians.....	112	145	11	7	7	25	26	14	15	41
Draftsmen & Tool Programmers(Numerical Control)[7]	112	287	25	10	12	47	49	26	27	76
Computer Programmers....	215	266	17	7	12	36	38	26	27	65

1/ Indiana Employment Security Division (IESD) data.
2/ IESD data: one-third 1985-1982 employment difference.
3/ Retirements and deaths (generally 3-5%: three times IESD percentage).
4/ Based on estimated 5% (5.25% with compounding) loss annually of total number employed due to job turnover.
5/ Data expanded to the universe (coefficient of expansion = 1.053) because IESD data represents only approximately 95% of total employment.
6/ Based on estimated 10% (11.03% with compounding) annual need for technological updating and retraining.
7/ Holders of an associate degree in drafting and those trained in the use of computer-aided drafting systems and electronic drafting equipment have the best career prospects. There will be a lessening demand for tracers and junior drafters.

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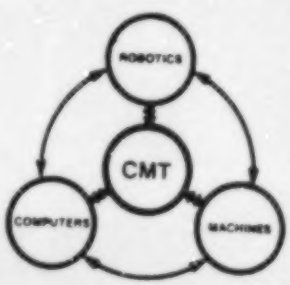
TABLE 5

ANNUAL REQUIREMENTS FOR
COMPUTER INTEGRATED MANUFACTURING TECHNICIANS
(Based on Expanded Grand Total Technician Requirements in Table 4)

Occupation	Expanded Grand Total	Ratio of CIMT'S to Other Technicians	Calculated CIMT Tech. Requirements
Industrial Engineering Technician.....	12	1 in 3	4
Mechanical Engineering Technician.....	49	1 in 3	16
"Other" Engineering Technicians.....	41	1 in 5	8
Draftsmen & Tool Programmers (Numerical Control)	76	1 in 10	8
TOTALS	178		36

NOTE: The Purdue Technical Advisory Committee (PTAC), in Kokomo is made up of approximately 20 members representing key industries in the area, plus the educators from the Purdue faculty on the Kokomo campus. The PTAC committee has specialized sub-committees including one concerning the local need for and nature of a CIMT program. Minutes of at least ten meetings (the earliest being 23 March 1983) were examined by the author of this study. Some sample statements from these meetings are presented below:

"CIMT is highly applicable to the IUK regional industrial needs." Also, "...(we) emphasize the need for CIMT graduates in the Kokomo area, and emphasize the unacceptability of waiting until the late 1980's for initial graduates..." "We want to initiate a CIMT program soon, we need graduates soon; we are willing to consider pioneering a program in Kokomo to get started." There were other strong statements of need and support by members of both the CIMT subcommittee and the PTAC committee-as-a-whole.



There were also references of committee members' discussions on the desirability of making the CIMT program a "plus two" years type program (i.e., junior and senior years) for two-year associate degree graduates in electrical and mechanical engineering technology programs. A subcommittee of PTAC studied alternatives and recommended that approach. They pointed out the baccalaureate CIMT graduate, based on the EET or MET associate degree graduate continuing studies would take advantage of these programs, save time, and also would produce a desirable graduate.

This committee, however, did endorse the two-year associate degree CIMT program, but pointed to the necessity for CIMT bachelor's degree graduates as soon as possible.

8. QUALITY CONTROL (Q.C.) SPECIALISTS

A. Descriptions

Quality control and reliability assurance in industry are critical functions. They are important in efforts to increase productivity and to gain market advantage. Much needs to be done to apply and advance related technology and science throughout American industry. Essentially, there are two levels of specialized personnel in this field, they are "Certified Quality Engineer," and "Certified Quality Control Technician." Panels of U.S., Japanese and Great Britain experts are in agreement that more advanced systems of quality control will be implemented. *(Source: CAD/CAM International Delphi Forecast, Dearborn, Michigan, Society of Manufacturing Engineers, 1980.)*

B. Needs for Q.C. Specialists

As stated earlier in this report, there are about 33,000 employees in Region 5 manufacturing firms. The size and nature of this industrial division warrants the establishment of instructional programs in quality control; the need to do so was confirmed in meetings with representatives of key manufacturing firms.

C. Instructional (Certificate) Programs for Q.C. Specialists

Examples of typical instructional topics, developed from guidelines of the American Society for Quality Control, are presented below. These programs should be worked out with the assistance of professional Q.C. personnel in local firms.

Certified Quality Control Engineer*

1. Quality Management
   Areas include: quality control systems, quality costs, quality planning, quality improvements, quality information systems, motivation and human factors, reliability
2. Metrology Inspection and Testing
   Areas include: non-destructive testing
3. Statistical Quality Control
   Areas include: process capability studies
4. Probability
   Areas include: description analysis
5. Correlation and Regression Analyses
6. Analyses of Variance and Experimental Design (ANOVA)

**This series of courses taken by a practicing engineer or an adult employee who has acquired the technical proficiency equivalent.*

Certified Quality Technician**

1. College Algebra
2. Statistical Quality Control
3. Metrology Inspection and Testing
4. Quality Control & Management

***A certificate of completion could be awarded to those completing these courses.*

NOTE: The above Q.C. specialists are certified by the American Society for Quality Control (not a license--but certification by peers). Besides passing examination, candidates must meet certain experience and other qualifications.

NOTE: Pertinent to this report are extracts from the most recent issue of the INDIANA BUSINESS REVIEW.*

"...Delco (a very large General Motors Division manufacturer of electronic equipment, particularly for the automotive industry) has unveiled a $38 million plan to construct its electronic technology center in Kokomo. ...In short, the current recovery has been remarkably good to this area, thanks to a strong and stable growth in the factory output...a lot of kick is still left in the manufacturing sector of the economy."

**The Indiana University School of Business, Division of Research, Volume 59, May-June 1984. page 18.*

The above extracts point up the urgency of proceeding with the expansion of Purdue's Statewide Technology Programs in Region 5.

Dr. J. P. Lisack

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9. EDUCATIONAL ACCREDITATION[9/]

A. "Regional" and Professional Accrediting Bodies

Good engineering and engineering technology programs have marks of excellence. Accreditation is such a mark. Many students go through their collegiate years without giving much thought to accreditation. Many employers and parents, however, investigate the accreditation status of colleges and curricula.

9/ *Source: ENGINEERING EDUCATION: May 1983, "Engineering Technology Comments--ABET--A Good Bet," Dr. Ron Williams, Del Mar College, page 770.*

There are two generally accepted forms of educational accreditation in the United States that are independent of required state and federal accreditations. One of these forms is "regional accreditation," which accredits institutions rather than curricula, disciplines or programs. Thus, regional accreditation is a wide brush touching all phases of operation and branches of an institution. Traditionally, detailed examination of programs and curricula are left to the second kind of accrediting agency, the professional accrediting body.

Most professions have an associated professional accrediting body. Professional accrediting bodies typically involve extensive and in-depth peer review of curricula and programs within a certain body of knowledge. There is little contact among accrediting bodies because of their specialized nature.

B. Accreditation of Engineering and Technology Programs

ABET is the Accreditation Board for Engineering and Technology. It is responsible for the accreditation of engineering and engineering technology degree programs in colleges and universities in the United States. The U. S. Department of Education and the Council on Postsecondary Accreditation (COPA) recognize ABET as the sole accrediting agency for engineering and engineering technology.

ABET is completely autonomous. It is financially independent to protect and assure objectivity in its evaluation of curricula and other activities. It maintains a cooperative relationship with several engineering groups, including the American Association of Engineering Societies.

Two commissions of ABET--the Engineering Accreditation Commission (EAC) and the Technology Accreditation Commission (TAC)--evaluate the appropriate curricula and are responsible for the decisions on accreditation. The ABET board of directors sets criteria, policy and procedures based on recommendations from the commissions and decides appeal cases.

C. Purdue University Engineering Technology Programs

It is the goal of the School of Technology for all engineering technology programs (both associate and bachelor's degrees in all fields) to achieve and maintain ABET accreditation. With the exception of newly established programs, this goal has been achieved.

10. ADULT EDUCATION

Data have been presented in this report

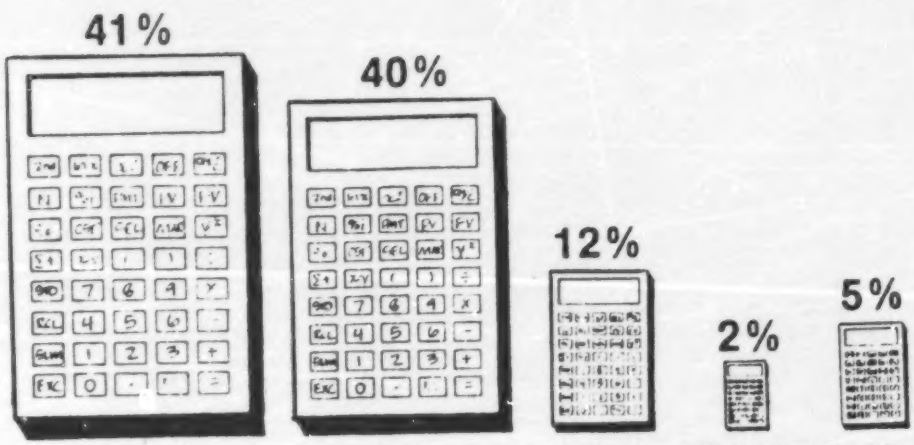
- That show that a large and growing proportion of the population projected for Region 5 will be in their middle working years (in the 35 to 49 age group).

- That compare educational attainment levels of adults and show that Region 5 adult postsecondary educational levels are well below the State and National levels.

- That reflect needs to update and retrain significant numbers of adults now in the workforce.

How do American working adults view the necessity for additional education or training to keep up-to-date in their job or to prepare for a new one? Results of a recent survey and educational research report are shown next.

Do you think changes in the workplace will require additional career education?



More than three-quarters of the American workforce believe they don't have the skills to find, keep and grow in their jobs. Eighty-one percent said the tremendous technological changes affecting business today will definitely or probably require them to get additional career education, according to a recent national study by Research & Forecasts, Inc. for ITT Educational Services, Inc.

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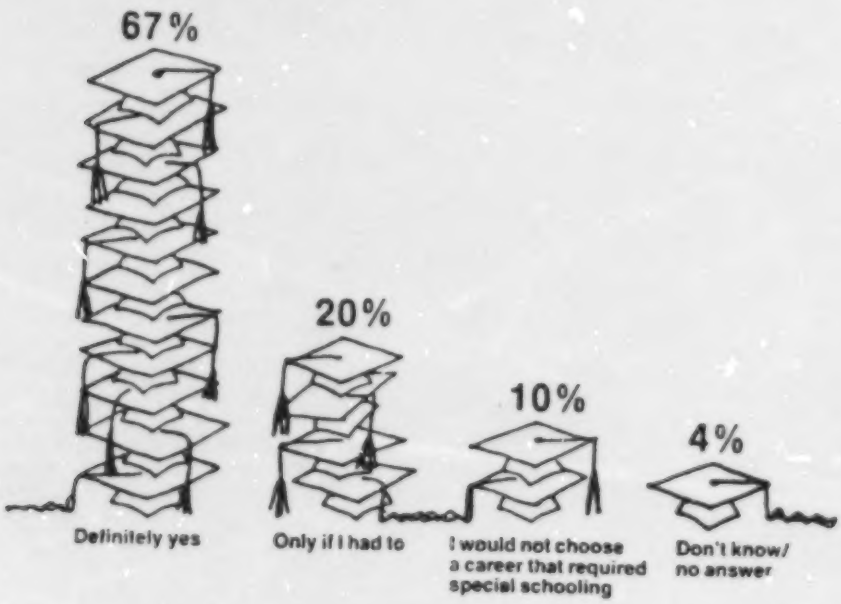
If you selected a new career that might require additional training, would you consider attending a specialized school to get that training?



Note: Due to rounding, the percentages do not always add to 100.1 percent.

There was a time when bachelor's degrees from U.S. colleges and universities provided all the training an individual needed for a career. That's no longer true and the American workers know it. Sixty-seven percent of the U.S. workforce said they would consider returning to school if their future career growth demanded it, according to a national study by Research & Forecasts, Inc. for ITT Educational Services, Inc.

11. ADVISORY COMMITTEE

Experience has shown that educational programs designed to meet defined needs are helped considerably through the assistance of local advisory committees. Membership on such committees is made up of qualified educators and practicing professionals who have expertise in related responsibilities and are desirous of helping. The input of such committees begins with the early-planning stages; determines the program goals, curriculum, and facilities; and continues through implementation, provision of support, evaluation and recommendations for improvement. This committee can also participate in long range planning efforts. The advice and assistance of such a committee is especially important to the CIMT program.

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12. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

A. Summary and Conclusions

(1) Population

Region 5 is projected to grow more than 4% in population by the year 2000 ending up with about 250,000 people. (The State as a whole is expected to grow about 6.7% during this time.) Howard, the largest county in the region, is expected to increase about 4%, ending with a population of more than 90,000 by the year 2000.

There will be fewer people in the younger age groups and a large increase in the 35 to 49 year age groups.

(2) Educational Attainment

The proportion of aduits with a high school diploma (but no higher education) is slightly higher in Region 5 than the State average; thus forming a reservoir of potential students for continuing education. However, the proportions who have 1 to 3 or 4 or more years of college in Region 5 are well below the State and National averages.

(3) Workforce

There is a viable workforce of more than 78,000 people in Region 5; nearly 33,000 worked in Manufacturing firms. About 17,600 worked in Service industries, and more than 13,100 worked in Retail Stores. Howard County had the highest proportions of these workers.

(4) Technical Training Requirements

a. Engineering Technology and Computer Technology

Data show an impressive need in Region 5 for training engineering technicians and computer programmers. Previous

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decisions to offer the related technology programs in Kokomo are strongly supported by the updated data.

Another impressive unmet need in Region 5 is for training new Computer Integrated Manufacturing Technicians and to update and retrain adults now in the workforce in related courses.

b. Computer Integrated Manufacturing Technology (CIMT)

A CIMT Associate Degree Program, designed to accommodate between 35 and 40 students should meet currently identified needs. This program should be designed to

1 Reflect the local modern manufacturing specialized personnel needs for technicians

2 Eventually attain CIMT program accreditation by the Accreditation Board for Engineering and Technology in order to assure its academic quality, and

3 Permit graduates to continue their studies to the baccalaureate level in technology programs.

(5) Support of CIMT Program and Substantiation of Need in Region 5

In recent studies done for the Society of Manufacturing Engineers, the current and growing requirement to modernize manufacturing industries in America is identified as an urgent necessity. These studies cite that a key element among the actions necessary is to increase related technical education for technicians, technologists and engineers. This requirement is not only current, it is growing over time.

The members of the Purdue Technical Advisory Committee in Kokomo, made up of representatives of the key industries in Region 5, have agreed unanimously on the necessity for a CIMT program at Kokomo and have urged its early establishment.

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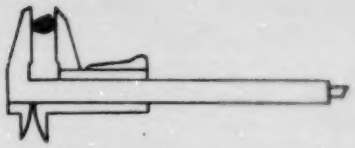

(6) Quality Control (Q.C.) Specialists

The situation in American manufacturing industry, and the size and nature of the industrial firms in Region 5, substantiate the need to provide courses in Quality Control. These include specialized courses for engineers and/or technically proficient personnel to be proficient as Certified Quality Control Engineers, and for preparing Certified Q.C. Technicians. Both can be prepared for the examination given by the American Society for Quality Control. A certificate of completion of the Q.C. course work could be awarded by Purdue University. These programs and related courses and experiences should be planned with the assistance of professional Q.C. personnel in local firms.

(7) Adult Continuing Education

The rapidly changing technology, particularly the impact caused by computers and modern manufacturing processes, require many adults to re-enter an educational or training program to stay abreast or to advance in their careers. Recent studies show there is a growing awareness among most adults of the necessity to do so. Other studies by Purdue's Office of Manpower Studies have shown that in order to select an educational institution the following are desired:

Rank Order	Condition
First	Offers what I want to study,
Second	Courses are offered locally,
Third	Courses are of high quality, and
Fourth	Cost is relatively modest.

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(8) Advisory Committee

Past experience has proven the value of the Kokomo Purdue Technology Advisory Committee (made up of educators and representatives from local firms). This committee's assistance is needed in matters such as planning, implementation and resource acquisition for the CIMT program.

B. Recommendations

(1) Computer Integrated Manufacturing (CIMT) Technology Program

It is recommended that the Purdue University two-year associate degree program in CIMT be authorized and initiated in Kokomo. The program should be designed to serve two basic student populations: (a) new and recent graduates of high schools for career preparation, and (b) adults now in the workforce who need to be retrained or their skills and knowledge upgraded. This CIMT program would be implemented in cooperation with Indiana University at Kokomo.

(2) Quality Control Specialists

It is recommended that courses be offered to prepare specialists in the manufacturing firms of Region 5 for the examination by the American Society for Quality Control. Courses should be designed for practicing engineers (or those with equivalent technical proficiency) to qualify as Certified Quality Control Engineers and for technicians to qualify as Certified Quality Technicians. These programs, courses and related experiences should be planned and implemented with the assistance of local Q.C. professionals.

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(3) Special Adult Education Considerations

Courses should be offered during both daylight and evening hours. Special admission procedures and counselling as well as remedial or tutorial services should be designed to service working adults.

Seminars, workshops, special familiarization programs and the like should also be offered as needs are ascertained and resources permit.

(4) Advisory Committee

It is recommended that the Purdue Technology Advisory Committee at Kokomo be requested to help in the following ways:

(a) Student recruitment, selection and counseling,
(b) Instructional program matters (e.g., curriculum & facilities)
(c) Teacher assistance (e.g., professional development and consulting)
(d) Attainment of accreditation by the Accreditation Board of Engineering and Technology
(e) Awards and public relations
(f) Maintaining liaison with appropriate contacts
(g) Development of future plans and training needs.

(5) Liaison and Coordination

Finally, it is recommended that close liaison be established and maintained with Purdue University's Department of Mechanical Engineering Technology, the director of the Purdue Statewide Technology Program and Indiana University at Kokomo authorities. It is also important to develop and maintain a good working relationship with the local (senior) chapter and the National Office of the Society for Manufacturing Engineers. A student chapter should be formed when the CIMT program is on stream. Joint planning and cooperative arrangements in implementing actions are necessary to facilitate the establishment of an effective CIMT program in Kokomo.

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